

CLAIMS

WHAT IS CLAIMED IS:

1. A locking device with a solenoid release actuator, comprising:
 - a) a housing;
 - b) a plunger axially slidable within the housing, at least a first portion of the plunger being made of a magnetically responsive material;
 - c) a biasing member which biases the plunger in a first direction;
 - d) one or more locking balls;
 - e) a solenoid coil disposed around at least the magnetically responsive portion of the plunger; and
 - f) the locking balls each disposed in an aperture in the housing, the plunger having a second portion thereof containing at least one recess which receives the balls, a member to be locked being held in a first locked position with the plunger in a first locking position and the balls in a radially outward position out of alignment with the recess, wherein in response to actuation of the solenoid, the plunger moves against the biasing member to align the recess with the balls, so that the balls move into the recess in the plunger thereby releasing the locked member.
2. The locking device of claim 1, wherein the biasing member exerts no more than about one pound on the plunger.

3. The locking device of claim 1, wherein the locking balls are adapted for holding the locked member against a force of at least about 150 pounds.
4. The locking device of claim 1, wherein the first portion of the plunger is generally cylindrical and the second portion is generally cylindrical and in which the at least one recess is formed, the second portion having a smaller diameter than the first portion.
5. The locking device of claim 1, wherein the locked member has a recess formed therein, and at least a portion of the housing and plunger, and the locking balls, are disposed in the recess in the locked member.
6. The locking device of claim 1, wherein the recess in the plunger has beveled portions and each aperture in the housing is beveled.
7. The locking device of claim 1, wherein the locking device locks fins of a missile, bomb or torpedo in a retracted position, and wherein the fins are biased into an operational position.
8. A bomb, missile or torpedo comprising:
 - a) a bomb housing having a head and tail;
 - b) fins proximate the tail;
 - c) a member disposed in a first position to hold the fins in a retracted position, and moveable to a second position where the fins are released and thereby deployed;

d) a locking device which maintains the member in the first position, and resettably releases the member in response to actuation, the locking device including:

e) a locking device housing;

f) a plunger axially slidable within the locking device housing, at least a first portion of the plunger being made of a magnetically responsive material;

g) a biasing member which urges the plunger in a first direction;

h) one or more primary locking balls;

i) a solenoid coil disposed around at least the magnetically responsive portion of the plunger; and

j) each primary locking ball being disposed in an aperture in the locking device housing, the plunger having a second portion thereof containing at least one recess which receives each primary locking ball, the member to be locked being held in the first position with the plunger in a first locking position and each primary locking ball in a radially outward position out of alignment with the recess, wherein in response to actuation of the solenoid, the plunger moves against the biasing member to align the recess with each primary locking ball, so that each primary locking ball moves into the recess in the plunger thereby releasing the locked member, and deploying the fins.

9. The bombs, missile or torpedo of claim 8, wherein the biasing member exerts no more than about one pound on the plunger.

10. The bomb, missile or torpedo of claim 8, further comprising a biasing device for biasing the locked member to move from a first position in which it is held by each

primary locking ball, to a second position when released by each primary locking ball, so as to deploy the fins, and wherein the primary locking balls are adapted for holding the locked member against a force of at least about 150 pounds.

11. The bomb, missile or torpedo of claim 8, wherein the first portion of the plunger is generally cylindrical and the second portion is generally cylindrical and in which the at least one recess is formed, the second portion having a smaller diameter than the first portion.
12. The bomb, missile or torpedo of claim 8, wherein the locked member has a recess formed therein, and at least a portion of the locking device housing and plunger, and each primary locking ball, are disposed in the recess of the locked member.
13. The bomb, missile or torpedo of claim 8, wherein the recess in the plunger has beveled portions and each aperture in the locking device housing is beveled.
14. An airborne device comprising:
 - a) a housing;
 - b) a first member disposed in a retracted position and movable to a deployed position for use;
 - c) a second member in a locked position holding the first member in the retracted position, and movable to a release position for deploying the first member;

d) a locking device which maintains the second member in the locked position, and which resettably releases the second member in response to actuation, the locking device including:

e) a locking device housing;

f) a plunger axially slidable within the locking device housing at least a first portion of the plunger being made of a magnetically responsive material;

g) a biasing member which urges the plunger in a first direction;

h) one or more primary locking balls;

i) a solenoid coil disposed around the magnetically responsive portion of the plunger;

j) each primary locking ball being disposed in an aperture in the locking device housing, the plunger having a second portion thereof containing at least one recess which receives each primary locking ball, the member to be locked being held in the first position with the plunger in a first locking position and each primary locking ball in a radially outward position out of alignment with the recess, wherein in response to actuation of the solenoid, the plunger moves against the biasing member to align the recess with each primary locking ball, so that each primary locking ball moves into the recess in the plunger thereby releasing the locked member, and moving the second member to the release position thereby deploying the first member.

15. The airborne device of claim 14, wherein the biasing member exerts no more than about one pound on the plunger.

16. The airborne device of claim 14, further comprising a biasing device for biasing the second member into the release position, wherein the biasing device exerts at least about 150 pounds on the second member.
17. The airborne device of claim 14, wherein the first portion of the plunger is generally cylindrical and the second portion is generally cylindrical and in which the at least one recess is formed, the second portion having a smaller diameter than the first portion.
18. The airborne device of claim 14, wherein the recess in the plunger has beveled portions and each aperture in the locking device housing is beveled.
19. The airborne device of claim 14, further comprising one or more secondary locking balls, each secondary locking ball being disposed in a further recess in the locking device housing, in a position for holding the locked member in place after each primary locking ball has moved into the recess in the plunger, and wherein the locked member is further released when each secondary locking ball moves into at least one further recess in the plunger, so that the second member can move to the release position, thereby deploying the first member.
20. The airborne device of claim 15, further comprising a biasing device for biasing the second member into the release position, wherein the biasing device exerts at least about 150 pounds on the second member.